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Idaho Department of Fish and Game

Lake Pend Oreille Predation Research Quarterly Report

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Inside this report:

Lake Habitat Use of Bull Trout, Lake Trout, and Northern Pikeminnow

From 21 June through 22 September, bull trout (n=5), lake trout (n=10), and northern pikeminnow (n=1) were located on a weekly basis to determine predator depth utilization in Lake Pend Oreille. In order for researchers to determine a realistic pelagic predator population estimate, it was essential to acquire this biological information. Bull trout were mostly found in benthic areas (i.e. close to bottom) during both day and night (>90%). Bull trout mainly occupied depths between 40 and 70 ft. (**Figure 1**) in water temps averaging 51ºF. Lake trout were also found mostly in benthic areas (>85%). Lake trout were tracked at greater depths than bull trout and were mainly located between 70 and 100 ft (**Figure 2**), in water temps averaging 48ºF. The one pikeminnow occupied the littoral area (i.e. near shore) in water depths < 30 ft and in water averaging 65ºF. Though lake trout occupied greater depths than bull trout, both species utilized similar lake habitat and were often located near each other.

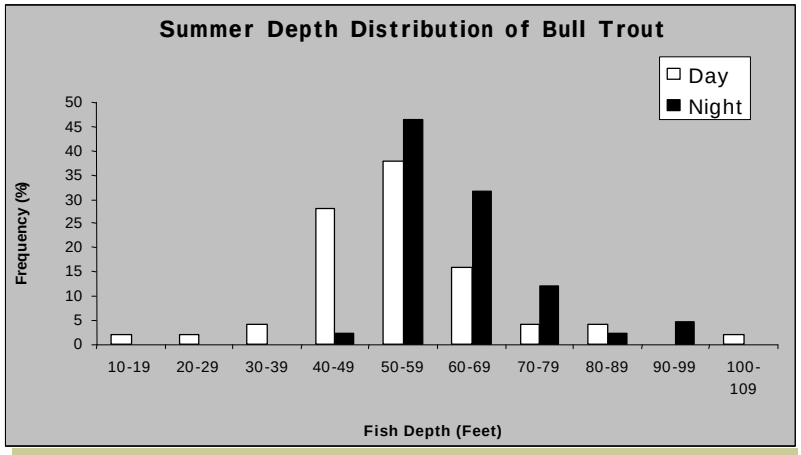

Figure 1. Summer (21 June-22 Sept, 2003) depth utilization of bull trout. Depth measurements were collected using sonic tracking equipment. NOTE: The X-axis scale is different than Figure 2.

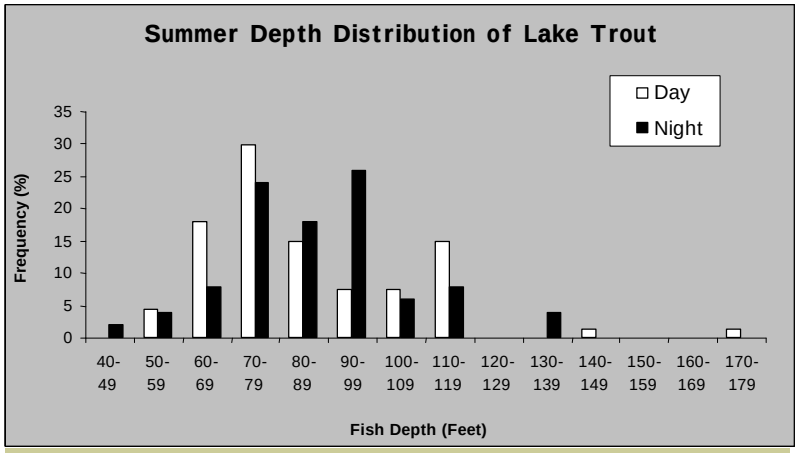

Figure 2. Summer (21 June-22 Sept, 2003) depth utilization of lake trout. Depth measurements were collected using sonic tracking equipment. NOTE: The X-axis scale is different than Figure 1.

This quarterly report contains preliminary data and conclusions that are not citable.

Funding for this study is provided by Bonneville Power Administration.

Nighttime Hydroacoustic Depth Distribution of Pelagic Fish > 16”

Hydroacoustic surveys can not directly identify fish species. We therefore hope to determine species by the habitat they occupy (e.g. fish depth, nearness to bottom, distance from shore, water temperature, etc.) **Figure 3** depicts all of the pelagic fish >16” that we recorded from 28 transects. When fish were graphed using 2 depth variables (fish depth and depth beneath fish), two major groups were distinguished. Our 2003 results mirrored our 2002 results, suggesting that large pelagic fish are occupying similar habitats from year to year. Now that we know where these unidentified fish are located we can incorporate sonic tracking and gillnetting to help define what species these groups represent (see page 3 for results that indicate group 2 fish are predominantly lake whitefish). This information will improve our pelagic predator estimate and help form a basis for predator and prey balancing.

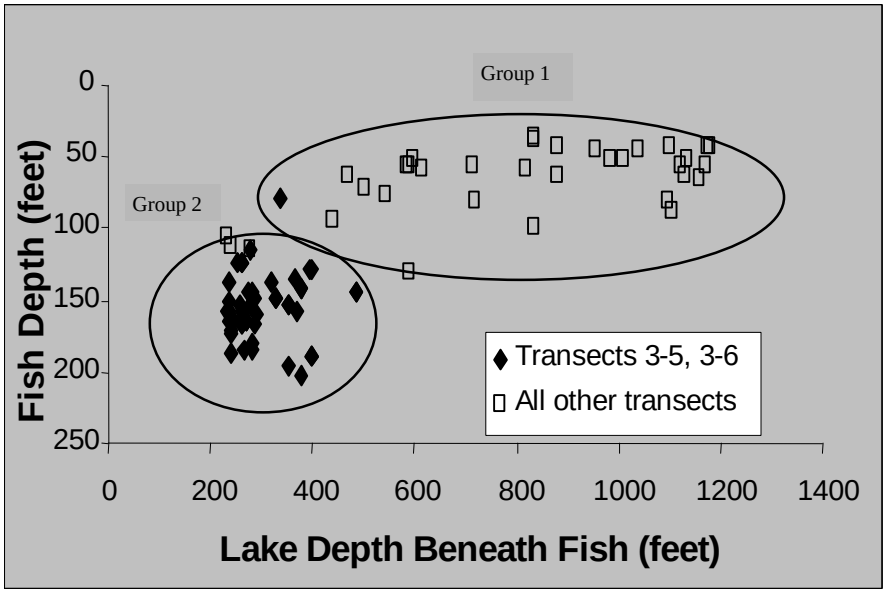

Figure 3. Nighttime depth distribution of pelagic fish > 16”. Group 2 fish are mostly located in the Northern end of Lake Pend Oreille.

Integrating Hydroacoustic Fish Data with Sonic Tracking Results

By locating sonic tagged predators during the same time we conduct hydroacoustic sampling we can determine habitat use overlap of known and unknown fish. Though most of our sonic tagged bull and lake trout occupied benthic areas, occasionally these fish were found in the deep open water. When we did locate pelagic bull or lake trout, they coincided with some of the unidentified fish from group 1 in Figure 3 and are shown here in **Figure 4**. By integrating our tracking data with our hydroacoustic data we provide evidence that helps identify a portion of the pelagic fish community. The big question we need to answer now is: where do rainbow trout fit in?

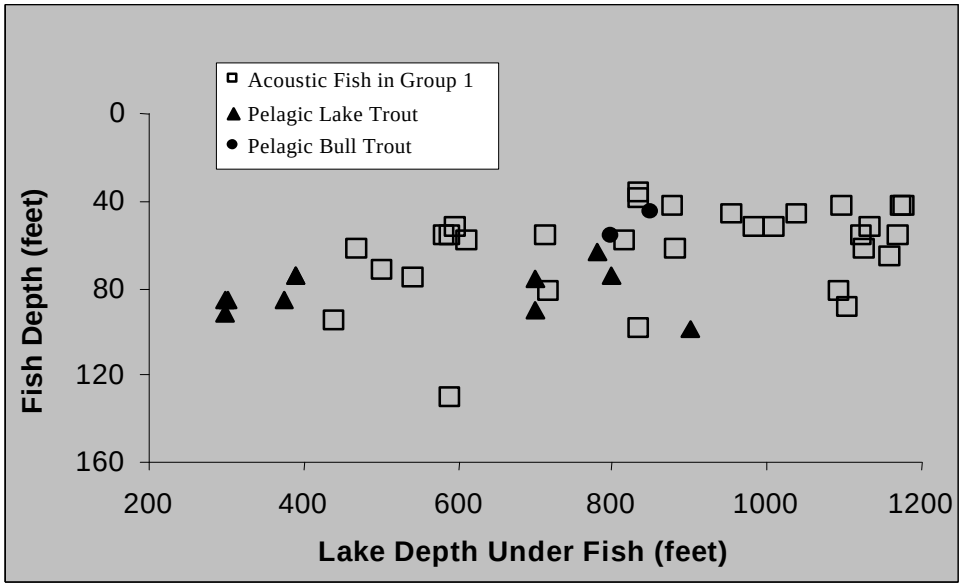

Figure 4. Nighttime depth distribution of pelagic lake trout, pelagic bull trout, and unidentified acoustic fish > 16” from Group 1. Depth location of lake trout and bull trout was identified using sonic tracking equipment.

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Gill Netting Hydroacoustic-Located Fish Communities for Species Composition

In addition to utilizing hydroacoustics for population estimates, it is also a very effective tool for locating specific areas where fish concentrate. Our hydroacoustic equipment allows us to approximate the size of the fish and also provides precise depth utilization of the fish or group of fish of interest. By observing hydroacoustic data while it is being collected, or by incorporating a GPS unit into the systems data recorder (i.e. laptop computer), a person can pinpoint exact locations of fish communities. Once communities are located a strategy can be devised (trawling, gillnetting, etc.) to determine what species of fish make up the unknown communities.

Figure 5. Researcher Matt Gearhiser removes a 16" lake whitefish from a pelagic gill net set in the northern section of Lake Pend Oreille.

During our 2002 and 2003 summer hydroacoustic surveys we identified 2 specific communities of fish. It was necessary for us to try and identify the species composition of the 2 communities to help us determine accurate abundance estimates of predator and prey populations.

One of the groups was located in the northern section of Lake Pend Oreille during the nighttime. This group consisted of large pelagic fish > 16" and its depth distribution is depicted in **Figure 3** (pg. 2) labeled as "Group 2." With these fish being so large we wanted to know if the group was composed of predators. Since midwater trawling at this group's location only captured kokanee and not fish > 16", we speculated that the larger fish were avoiding the trawl net. We acquired neutrally buoyant "curtain" style gill nets and performed two 2 h sets, two 4 h sets, and two overnight sets. We suspended the nets between 150 and 170 ft over 250-400 ft of water. The nets fished a total of 32 hours and captured 2-16" lake whitefish (**Figure 5**). Though our catch rate was very low our efforts indicated that some portion of the community is composed of lake whitefish.

The second community of unidentified fish was found between 400 and 600 ft of water during daytime hours. Most of these fish were found suspended over very deep water (>700 ft). We first recognized this community during our 2002 summer surveys and detected it again during our 2003 surveys. The size of these fish range between 2 and 12 inches. Since this community is so deep we were unable to utilize trawl gear to attempt and capture the fish. In order to fish gill nets effectively, we located an area where this community occurred near the bottom (**Figure 6**) and set our nets. After fishing a total of 25.5 net hours we captured 9 kokanee ranging in size from 7 to 9 inches. We also captured 3 bull trout measuring 12, 18, and 25 inches. Kokanee are apparently moving into deep water to avoid predation. However, bull trout are right along side them to take advantage of the food source.

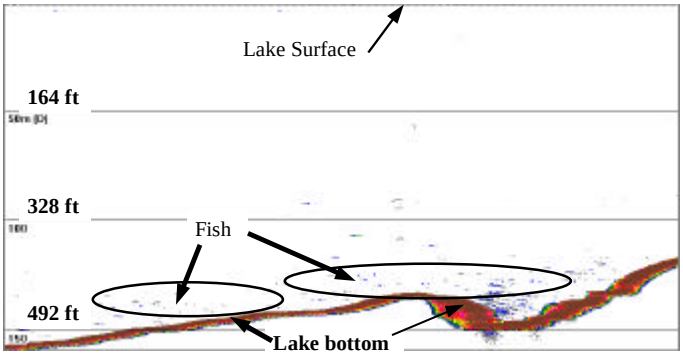

Figure 6. Section of a hydroacoustic echogram showing where deep water fish are near bottom. This area was used by researchers to perform deep water gill netting.

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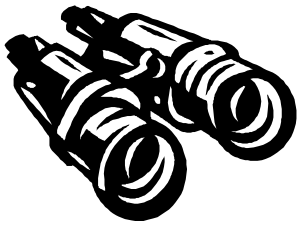
Performance Results of an Omnidirectional Hydrophone and Directional Hydrophone During Summer Lake Stratification

On 4 August we compared the performance of a directional hydrophone (Sonotronics DH-4) to an omnidirectional hydrophone (Sonotronics SH-1). Three tests were performed to determine which hydrophone would be most effective during summer lake stratification (thermocline during testing was between 45 and 60 ft). For test 1 we placed a sonic tag at 15 ft within 100 ft from shore. For the second test we put the tag down to 100 ft and positioned the tag so it was within 30 ft off the bottom. For the third test we stationed the tag at 100 ft over very deep water (> 400 ft). The test scenarios were designed to imitate the areas where we had encountered tagged fish prior to testing. For each test we lowered the directional hydrophone to a depth of 10 ft and the omnidirectional hydrophone was lowered to approximately 80 ft. The omnidirectional hydrophone only had a slight range advantage over the directional hydrophone (1.1 mile vs. 1.0 mile, respectively). With such a small difference in range, coupled with the disadvantage of not detecting a tags direction with the omnidirectional, we decided to utilize the directional hydrophone for summer tracking.

New Biologist Hired to Study Deep Water Trap Netting Efforts

During this past quarter, Mike Peterson was hired as a fishery research biologist to help the Lake Pend Oreille Predation project balance predator and prey populations. Mike's principle duty will be to work with Lake Pend Oreille deep water trap net fishermen. The fishermen are utilizing deep water trap nets to capture and eventually remove lake trout for the benefit of kokanee salmon, native bull trout, and the highly renowned rainbow trout fishery. Mike will monitor the effectiveness of the deep water trap nets and initiate a lake trout mark and recapture study. With the mark and recapture study we hope to get an accurate population estimate of lake trout to complement predator and prey balancing. An accurate estimate of lake trout is necessary since our sonic tracking research indicates that most of the lake trout utilize benthic habitats and would not be included in our pelagic predator estimate.



Looking for past reports????

Access the following web address for all past issues of Lake Pend Oreille Predation Research reports:

http://www2.state.id.us/fishgame/common/technical/fisheries.cfm

Activities for Next Quarter

During the final quarter of 2003 we will complete our 2002/2003 annual report. We will estimate lake wide summer density and biomass of pelagic fish and pelagic predators > 16". We will process all of our August 2003 daytime hydroacoustic data and compare it to our nighttime data. Autumn habitat utilization and movements of bull trout and lake trout will also be examined. Our new fishery research biologist, Mike Peterson, will determine the effectiveness of deep water trap netting in Lake Pend Oreille and begin a lake trout mark and recapture study.

Illustration by J.R. Tomelleri

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